Brief Reports

Twenty-Four-Hour Urine Cortisol in Combat Veterans with PTSD and Comorbid Borderline Personality Disorder

Studies examining mean 24-hour urine cortisol excretion in patients with posttraumatic stress disorder (PTSD) have yielded mixed results with seven reports showing significantly lower urine cortisol levels, three showing significantly higher cortisol levels, and two studies failing to demonstrate significant group differences between PTSD patients and healthy comparison subjects (Yehuda, 2002). Multiple reasons have been proposed for the discrepant results ranging from biological methodologies to variation in subject selection (Yehuda, 2002). The lack of agreement has prompted investigators to search for factors that may contribute to variability. While the relationship between cortisol levels and comorbid axis I disorders, such as major depression, has previously been examined (Yehuda, 2002), we are aware of no investigations that have addressed the potential contribution of axis II disorders, such as borderline personality disorder (BPD), to variability in cortisol levels among patients with PTSD.

In the present study, 24-hour urine cortisol excretion was compared between 37 combat veterans with PTSD comorbid with BPD and 18 combat veterans with PTSD only. Because low cortisol has been associated with a wide range of somatic disorders linked with early abuse and trauma (such as chronic pelvic pain, chronic fatigue, and fibromyalgia; Malt et al., 2002) and because most BPD patients have histories of childhood trauma (Zanarini et al., 2000), we hypothesized that cortisol would be lower in the PTSD plus BPD group compared with the PTSD group alone.

Methods

Subjects included 55 male Vietnam veterans with DSM-III-R combat-related PTSD who completed an intensive inpatient PTSD treatment program at the West Haven VA Medical Center. All subjects provided written informed consent. Diagnoses of PTSD and BPD were established using the SCID and the SCID-II. Methodologies for 24-hour urine collection and hormone assays have been described in detail in one of our previous publications (Mason et al., 2001).

Exclusion criteria for the current study were antisocial personality disorder, psychotic disorders, major medical illness, hormonal medication, organic brain syndrome, drug or alcohol abuse within 3 months of program admission or during the program (confirmed by urine toxicological screening), and current use of psychotropic medication (discontinued within 3 weeks of entry to study).

Subjects were divided into two study groups. One study group was positive for SCID-II BPD (PTSD+BPD; $N = 37$), and the other study group was not (PTSD-only; $N = 18$). Subjects completed a large psychological assessment battery, which included the Mississippi Scale for Combat-Related PTSD.

Results

Current comorbid diagnoses included major depression (54.5%), drug dependence (43.6%), alcohol dependence (41.8%), panic disorder with agoraphobia (34.5%), and obsessive-compulsive disorder (21.8%). None of these disorders were significantly different between the two study groups (chi-square = .076 to .650). Mean number of SCID-II BPD symptom criteria met for the PTSD+BPD group was 6.1 (SD, 1.0), which was significantly greater than the mean number for the PTSD-only group [2.7; SD, 1.5; $t(53) = 10.490$; $p < .001$]. The groups did not differ on the Mississippi Combat-Related PTSD Scale [134.1; SD, 14.7 and 137.5; SD, 14.8, respectively; $t(53) = .795$]. Average GAF score for the entire sample was 52.6 (SD, 8.4), and it did not differ significantly between study groups [$t(47) = .803$].

Average age for the full sample was 43.5 years (SD, 2.5), and there was not a significant difference between the study groups [$t(53) = 1.325$]. Race/ethnicity for the full sample was 87% white, 6% African American, 4% Hispanic, 2% Native American, and 2% other. There were equal proportions of white and minority subjects in each study group.

Mean urinary cortisol for the PTSD+BPD group was 58.70 μg/day (SD, 21.60) at entry and 46.83 μg/day (SD, 22.65) at discharge. Mean urinary cortisol for the PTSD-only group was 74.06 μg/day (SD, 33.57) at entry and 61.22 μg/day (SD, 27.09) at discharge. Mean urinary cortisol excretion for the overall group of subjects was 63.73 at admission and 51.54 at discharge (Figure 1).

Differences in program entry and discharge urine cortisol for both groups were assessed using repeated measure analysis of variance (ANOVA). This yielded a significant effect for cortisol change from entry to discharge [$F(1,53) = 8.973$, $p < .01$], a significant between-subjects effect for study group [$F(1,53) = 6.295$, $p < .05$], and no significant interaction for cortisol change by study group [$F(1,53) = .014$]. Post hoc analyses indicated the PTSD+BPD group had lower urinary cortisol at program entry [$t(53) = 2.051$, $p < .05$] and discharge [$t(53) = 2.072$, $p < .05$].

Discussion

In the present study, combat veterans with PTSD and comorbid BPD had a significantly lower mean 24-hour urine cortisol level than combat veterans with PTSD alone. The 24-hour urine cortisol level for the PTSD+BPD group was 58.70 μg/day at admission and 46.83 μg/day at discharge. While these values are significantly lower than the values observed for PTSD-only patients (74.06 μg/day at admission and 61.22 μg/day at discharge), they are nevertheless higher than values reported in three other studies of combat veterans with PTSD (Yehuda, 2002). In these other studies, it is

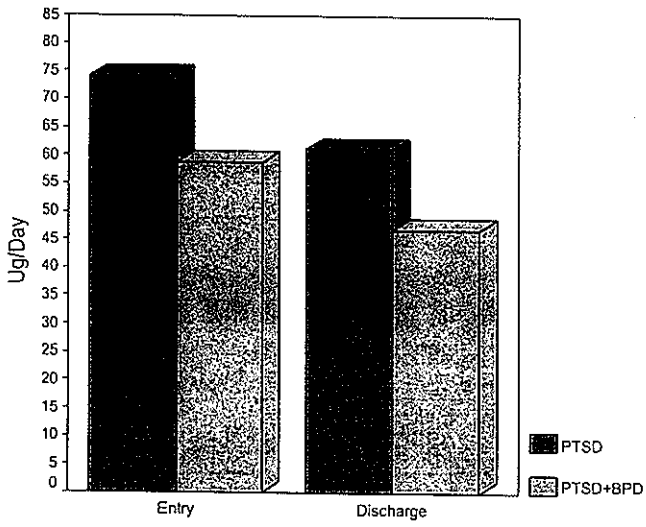

FIG. 1. Mean 24-hour urine cortisol excretion in subjects with posttraumatic stress disorder (PTSD) compared with subjects with PTSD and comorbid borderline personality disorder.

likely that additional sources of variability were present, such as variations in the stress intensity of the study conditions and the severity of illness.

It is possible that differences in cortisol excretion between the two groups reflect differences in severity of PTSD symptoms rather than factors related to BPD per se. However, the two groups in this study did not differ in level of core PTSD symptomatology (Mississippi scale) or in overall functioning (GAF score). Comorbid depression may also explain differences in cortisol between the two groups. However, our two groups did not differ in rate of comorbid depression.

Low cortisol levels in combat veterans have previously been conceptualized as psychogenically determined by emotional numbing and antiarousal-disengagement in relation to shame-laden depression (Mason et al., 2001). The lower cortisol level in the PTSD+BPD group may be seen as consistent with this conceptualization given that emotional numbing and excessive shame have been identified as core issues in BPD (Linehan, 1993). That both groups had relatively higher cortisol levels on admission compared with discharge may indicate greater activation of the HPA axis at the time of admission due to the stress of a novel environment.

The present study has a number of limitations, including small sample size, inclusion of men only, and restricted age range. Further, all subjects suffered from chronic combat-related PTSD, which may not generalize to other traumatized populations. Finally, while the present study compared PTSD alone with PTSD with comorbid BPD, it is possible that most, if not all, of the latter group met criteria for complex PTSD (Herman, 1992; Southwick et al., 1993). It may be that complex PTSD, as opposed to PTSD plus comorbid BPD, represents a more accurate clinical formulation for many of these subjects.

Conclusion

The present report suggests that relatively lower 24-hour urine cortisol excretion may be characteristic of a subgroup of traumatized veterans with PTSD and comorbid BPD, and that comorbid BPD likely explains some of the 24-hour urine cortisol variability that has been reported among published PTSD studies (Yehuda, 2002).

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Korsakoff Patients' Memories of September 11, 2001

Flashbulb memories (FBMs) refer to detailed and vivid memories for circumstances in which one first heard news of unexpected, dramatic events (*i.e.*, reception events; Brown and Kulik, 1977). For example, almost all Americans of a certain age remember what they were doing when they heard about the assassination of John F. Kennedy. Brown and Kulik (1977) postulated a special neural mechanism that might underlie these detailed memories, the "Now Print!" mechanism. These authors assume that activation of this Now Print!